ELSEVIER

Endovascular Repair of Abdominal Aortic Aneurysm using Bifurcated Stent-graft in a Patient with Complete Occlusion from the Common to the External Iliac Artery

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Extensive iliofemoral occlusive disease can limit the use of endovascular aortic aneurysm repair (EVAR), and the treatment strategy varies depending on severity of the lesion. In cases of mild iliac artery (IA) stenosis, predilation using a balloon catheter before EVAR is relatively common, and for severe IA stenosis, the technique of internal endoconduits has been reported with good results. In contrast, EVAR using an aortouni-iliac stent graft with femorofemoral crossover bypass has traditionally been used for abdominal aortic aneurysm with IA occlusion. However, EVAR using a bifurcated stent graft has some clear advantages over aortouni-iliac stent grafts. In this report, we describe and discuss technical aspects and feasibility of chronically occluded iliac artery recanalization before EVAR to facilitate the use of bifurcated stent grafts in a patient with concomitant complete common to external IA occlusion.

Compared with open surgery, endovascular aortic aneurysm repair (EVAR) has been found to have lower rates of mortality and morbidity.[1] However, according to the instructions for use of devices used in EVAR, iliofemoral occlusive disease limits usage of EVAR in up to 6% of patients who are otherwise suitable for the procedure,[2] and for abdominal aortic aneurysm (AAA) with iliofemoral occlusive disease classified as a Trans-Atlantic Inter-Society Consensus (TASC) D lesion, open surgery is recommended. Also, treatment strategy differs with severity of iliofemoral occlusive disease. In cases of stenosis, which is not rare among patients with AAA, EVAR using bifurcated stent grafts with balloon catheter predilation or technique of internal endoconduits has been used with good results.[3,4]

In contrast, AAA with concomitant iliac artery occlusion is rare,[5] and patients who are at high risk of complications from open surgical repair are traditionally treated with EVAR using an aortouni-iliac stent graft and a femorofemoral crossover bypass with promising results.[6,7] However, although bifurcated stent grafts have some clear advantages over aortouni-iliac stent grafts,[5,8] the recanalization of chronically occluded iliac arteries before EVAR to facilitate the use of bifurcated stent grafts is not routinely used, and there are only few reports in the English literature to date reporting this technique.[5,8] In this report, we describe a successful case in which EVAR was performed

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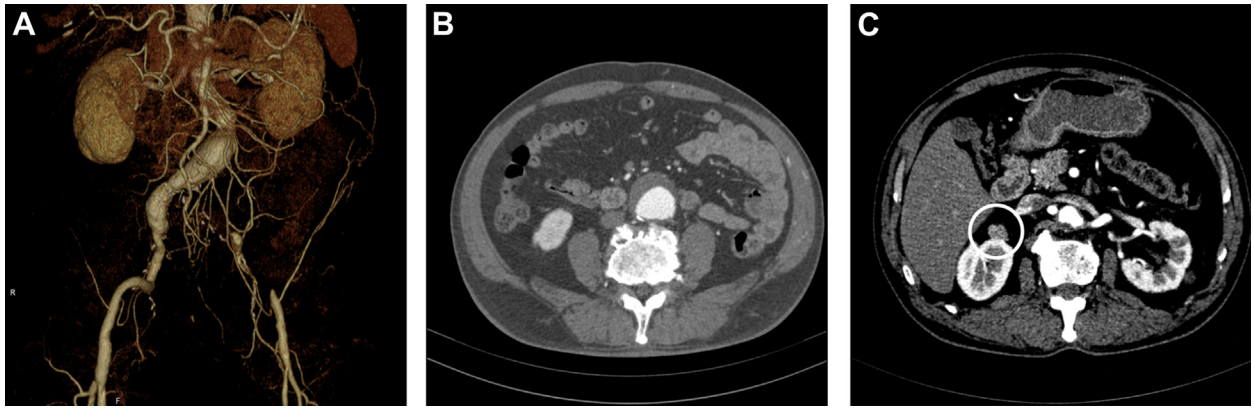

Fig. 1. Preoperative computed tomography (CT) scans. (**A**) Reconstructed 3-dimensional CT scans show an abdominal aortic aneurysm (AAA) with concomitant occlusion from the left common iliac artery to the left external iliac artery. (**B**) A CT scan showing AAA. (**C**) A CT scan showing right renal cell carcinoma (white *circle*).

after recanalization of a complete occlusion from the left common iliac artery (CIA) to the left external iliac artery (EIA) and discuss the technical aspects and feasibility of the procedure.

CASE REPORT

A 65-year-old man with a history of hypertension, diabetes mellitus, dyslipidemia, transient ischemic attack, and effort angina had continuous rest pain in his left leg. The leg was pale, with no palpable pulse below the common femoral artery (CFA), and the ankle–brachial index (ABI) was not measurable. Computed tomography (CT) scanning revealed complete occlusion from the left CIA to the left EIA, a 45-mm diameter AAA, and right renal cell carcinoma (Fig. 1). The presence of critical leg ischemia mandated urgent treatment, but the patient was considered to be at high risk of complications from major open abdominal surgery. Moreover, a urology consultation determined that the renal cancer could be treated with a laparoscopic partial nephrectomy. We therefore planned to treat only the left iliac artery (IA) occlusion (percutaneously and with the patient under local anesthesia) and to perform the partial nephrectomy as a second operation. However, because the diameter of AAA had enlarged since its initial detection 5 years earlier and was now approaching 5 cm, and because it is true that previous vascular intervention will sometimes make future intervention difficult,[9] we decided to revascularize the left leg and perform EVAR during the same operation. Regarding the internal iliac artery (IIA), because the right IIA was occluded and the patent left IIA was supplied mainly from the inferior mesenteric artery (IMA), EVAR covering the IMA had possibilities of ischemic complications. However, there have been reports of occluding both IIAs without complications,[10] and given that the patient was at high risk, to make procedure time as short as possible, we planned to revascularize the left IIA only if there were no visualization of the IIA branches through collateral circulations after final angiography.

The procedure was performed in the operating room with the patient under general anesthesia. Both CFAs and the left brachial artery (BA) were surgically exposed. To mitigate the risk of distal embolism, the distal end of the left CFA was clamped first. The vessel was then punctured for insertion of an 8-French sheath (Cook Medical Inc., Bloomington, IN). A pigtail catheter was used to obtain an aortography image from the left BA (Fig. 2A). Retrograde recanalization of the IA was attempted by using a 0.035-inch angled Glidewire (Terumo Medical Corp., Tokyo, Japan) supported by a 4-French vertebral Glidecath catheter (Terumo). The Glidewire passed easily through the EIA but entered the subintimal space at the CIA. Use of a parallel wire technique[11] using a 0.018-inch V-18 guidewire (Boston Scientific Corp., Natick, MA) was unsuccessful in achieving access to the true lumen. Antegrade recanalization through a 7-French × 90-cm shuttle sheath (Cook Medical Inc.) from the left BA was also attempted, but the orifice of the left CIA could not be located. Finally, retrograde intraluminal crossing was achieved by using an intravascular ultrasonography (IVUS)–guided wiring technique[12] (Visions PV 018; Volcano Corp., San Diego, CA) and a stiff 0.018-inch Astato guidewire (St. Jude Medical, Tokyo, Japan). The guidewire was snared from the shuttle sheath in the left BA by using an En Snare system (18–30 mm × 100 cm; Merit Medical Systems Inc., South Jordan, UT), and ''through-and-through'' technique was established between the left CFA and left BA. Because dilation of the occluded IA and advancement of the stent graft carried a risk of rupture, a Coda balloon catheter (Cook Medical Inc.) was prepared on the back table as an occlusion balloon in case of rupture at this moment.

Predilation of the left EIA to the left CIA was performed with a Genity balloon catheter (4 mm × 40 mm; Kaneka